



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

A M E R I C A N
Journal of Mathematics
PURE AND APPLIED.

EDITOR IN CHIEF,
J. J. SYLVESTER, LL. D., F. R. S., *Corr. Mem. Inst. of France.*

ASSOCIATE EDITOR IN CHARGE,
WILLIAM E. STORY, PH. D., (*Leipsic.*)

WITH THE CO-OPERATION OF
BENJAMIN PEIRCE, LL. D., F. R. S., SIMON NEWCOMB, LL. D., F. R. S.,
PROFESSOR OF MATHEMATICS IN HARVARD CORR. MEM. INST. OF FRANCE,
UNIVERSITY, SUPERINTENDENT OF THE AMERICAN EPHEMERIS,
In Mechanics, In Astronomy,
AND
H. A. ROWLAND, C. E.,
In Physics.

PUBLISHED UNDER THE AUSPICES OF THE
JOHNS HOPKINS UNIVERSITY.

Πάντα γὰρ μὲν τὰ γινωσκόμενα ἀριθμὸν ἔχοντι.—*Philolaos.*

Volume I. Number 3.

BALTIMORE:

PRINTED FOR THE EDITORS BY JOHN MURPHY & Co.

B. WESTERMANN & Co., }
D. VAN NOSTRAND, } *New York.*
TRÜBNER & Co., *London.*

A. WILLIAMS & Co., *Boston.*
FERREE & Co, *Philadelphia.*
A. ASHER & Co., *Berlin.*

GAUTHIER-VILLARS, *Paris.*

1878.

American Journal of Science and Arts

(Founded by Professor SILLIMAN in 1818) ended its 1st Series of 50 volumes, as a quarterly, in 1845, and its 2d Series of 50 volumes, as a two-monthly, in 1870.

A THIRD SERIES in MONTHLY numbers commenced January, 1871

Devoted to Chemistry, Physics, Geology, Mineralogy, Natural History, Astronomy, Meteorology, etc.

Two Volumes, over 450 Pages each, Published Annually.

Editors: JAMES D. AND E. S. DANA, AND B. SILLIMAN.

Associate Editors: PROFESSORS GRAY, GIBBS, AND COOKE, OF CAMBRIDGE; NEWTON, JOHNSON, BRUSH, AND VERRILL, OF YALE; AND BARKER, OF PHILADELPHIA.

Subscription price **\$6.00** a year, with **12** cents for prepaid postage; **53** cents a number. A few complete sets on sale of the First and Second Series.

Address the Proprietors,

JAMES D. & E. S. DANA, New Haven, Ct.

THE JOURNAL OF SPECULATIVE PHILOSOPHY.

Published Quarterly in St. Louis, Missouri.

It is intended as a vehicle for such translations, commentaries, and original articles, as will best promote the interests of Speculative Philosophy in all its departments.

TERMS OF SUBSCRIPTION.

Three dollars per volume; single number, 75 cents.

Vols. I and II, bound in one volume in muslin, will be sent by mail for \$5.00.

Vol. III, Vol. IV, Vol. V, Vol. VI, Vol. VII, Vol. VIII, Vol. IX, Vol. X, Vol. XI, and Vol. XII, in muslin, \$3.00 each.

Back volumes (unbound) may be had at \$2.00 per volume,

To English subscribers the price is 16s. per volume, 4s. per number.

All foreign subscribers should order through Messrs. TRÜBNER & Co., 57 Ludgate Hill, London.

All subscriptions (within the United States) should be addressed to the Editor,

WM. T. HARRIS, Box 2398, St. Louis, Mo.

THE JOURNAL OF THE FRANKLIN INSTITUTE,

Devoted to Science and the Mechanic Arts.

ESTABLISHED IN 1826.

The only Technological Journal published in the United States, without private pecuniary interest.

Its object is to encourage original research, and disseminate useful knowledge in all matters relating to the practical application of Science, but more especially to Engineering and the Mechanic Arts.

The JOURNAL is issued in monthly numbers, of seventy-two pages each, largely illustrated, forming two volumes annually. The number for June, 1878, completed the One Hundred and Fifth volume.

SUBSCRIPTION PRICES.

To Members, \$3.00 per Year.

Single Copies, 25 Cents.

To Non-Members, 5.00 per Year.

Single Copies, 50 Cents.

RATES OF ADVERTISING.

	1 YEAR.	6 MONTHS.	3 MONTHS.	1 MONTH.
One PAGE,	\$60.00	\$32.00	\$18.00	\$10.00
Half “	32.00	18.00	14.00	6.00
Quarter “	18.00	14.00	10.00	4.00

Communications for the JOURNAL and Business Letters should be Addressed to the Secretary of the Franklin Institute, Philadelphia, Pa.